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DISCUSSION

Dr Stephen Cheng (*Hong Kong, China*). Dr Starnes presented his early results from the IDE clinical trial on PMEGs in a series of 26 patients with juxtarenal aortic aneurysms. He is to be congratulated in achieving excellent early outcomes with limited tools on the back table.

In a custom-made device, it is possible to place the fenestrations in the optimum position to match the patient's anatomy and adjust the stents to fit around them, but when fenestrations are made on an already-sterile graft, it may be necessary to place the fenestrations in a perhaps less-than-optimum position to fit in between the stent struts. The fact that Dr Starnes can achieve a 100% technical success rate is testimony to his planning skills and technical expertise.

Devices modified in this manner were by all accounts similar to the early fenestrated grafts that were made and implanted in other patients outside the United States. Although the follow-up period of this present series is a mere 11 months, there is no reason to suspect that longer-term outcomes would not be as good, if not better, than those published by the same group in this month's *Journal of Vascular Surgery.* In the inevitable comparison between the two series, it is evident that a larger number of fenestrations were used in the later IDE trial, in particular for the SMA. The authors attributed this to a need to maximize proximal seal.

I have the following questions for Ben:

You addressed the issue of not stenting the SMA due to limitations of the stent struts crossing the large fenestration. In this manner, the SMA fenestration essentially functions as a large scallop and cannot add much to extending the proximal seal. In your opinion, would that limit the PMEGs to treating juxtarenal aneurysms, but not true suprarenal aneurysms? Have you used this graft to treat aneurysms with less than the 2-mm neck length?

On a technical note, when you used nitinol snares around the fenestrations, do these function only as a radiopaque marker? In standard fenestrated grafts, the nitinol reinforcing rings help to lock the stents onto the fenestration and allow for better flaring. Unreinforced fenestrations may stretch and expand in size to the diameter of virtually any balloon that was used, and the origin of the target vessel could be expanded to more than would be considered safe. Do you see these as concerns for long-term failure?

Finally, in light of the competing fenestrated systems such as the Ventana and the Anaconda, or the newer-generation Zenith p-branch off-the-shelf devices, how do you see the role of physician-modified grafts in the future?

I thank the society for the opportunity to discuss this paper.

Dr Benjamin Ware Starnes. Thank you, Stephen, for those insightful comments. Regarding the SMA fenestration remaining unstented, I do not believe that this fenestration serves merely as a scallop. In fact, with PMEG, I have found that the creation of a scallop using these techniques actually disrupts the integrity of the proximal graft fabric and makes the device more difficult to reload into the sheath. Also, there is actually quite good seal in and around the unstented SMA fenestration in these cases. Remember that we are confined by the standard Cook device design and try at all costs to leave the renal fenestrations strut-free. This then, in the majority of situations, leaves struts spanning the SMA fenestration. Stenting the SMA in this situation, I believe is fraught with hazard to include stent kinking and crushing with greater radial strength of the existing struts over the renal stents. This leads to the second part of your first question which is—PMEG is really only for true juxtarenal aneurysms with at least 2 mm of neck below the renal arteries, not for para- or suprarenal aneurysms. All of these patients had at least 2 mm of neck with a range of between 2 and 11 mm.

The gold markers are hand sewn into place using 4-0 prolene in a 720° circumferential fashion, so while not being a true reinforced fenestration, with good aortic wall apposition and parallel walls, I believe this is a durable alternative. One of the benefits of this IDE is going to be the ability to assess the durability of this approach over the long term.

Finally, even with off-the-shelf solutions in the industrial pipeline, I still believe that there will be a role for PMEG in specific anatomic situations. These grafts are truly customized to each and every patient, and time will tell if they are even *more* durable than an off-the-shelf solution to manage more than just 70% of patients with juxtarenal aortic aneurysms, which is what these new grafts tout.